are also reflected in the mortality rates under these circumstances. While radical re-exploration may be a valuable option in experienced hands, its use must be tempered by the realization that it is inherently a much riskier procedure.

It is well described that complete resection is the single most important factor in survival of patients with adenocarcinoma of the pancreatic head. The fact remains that in the absence of frank distant metastases or peritoneal seeding, local unresectability is an intraoperative decision based on the surgeon's perspective and abilities, and the availability of ancillary medical support. In smaller practices, if locally advanced pancreatic carcinoma is discovered intraoperatively, referral to a nearby major medical center should be considered. A case may be made for expeditious referral; this theoretically would allow less time for potential disease progression before re-exploration.

ACKNOWLEDGMENTS

The Chief, Bureau of Medicine and Surgery, Navy Department, Washington, DC, Clinical Investigation Program sponsored this report #84-16-1968-524, as required by HSETCINST 6000.41A.

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COMMENTARY

Surgical resection remains the only potentially curative treatment strategy for patients with adenocarcinoma of the pancreatic head. Patients who undergo successful resection of the primary tumor combined with either pre- or postoperative chemoradiation have a 5-year survival rate of up to 20% and a median survival of 18–19 months [1]. In contrast, patients with locally advanced, unresectable disease treated with palliative chemoradiation have a median survival of only 10–12 months, with virtually no chance for long-term survivorship [2]. Importantly, patients who undergo pancreaticoduodenectomy but are found to have a positive margin of resection also have a median survival of only 10 months [1,3]. Therefore, it is essential that surgery be applied only to patients with localized, potentially resectable pancreatic cancer. Traditionally, however, only one third of patients who undergo operations with curvative intent have their pancreatic cancers successfully removed; the remaining patients are found to have unsuspected liver or peritoneal metastases or, most commonly, local tumor extension to the superior mesenteric vein or artery [4]. These patients undergo a large operation associated with an often prolonged recovery period yet survive less than 1 year [5]. Further, laparotomy for palliation in this subgroup of patients is often unnecessary because of recent advances in endoscopic, percutaneous, and laparoscopic methods of biliary decompression. Therefore, in the absence of significant innovations in systemic therapy, the only potential for major improvements in the quality of life of patients with pancreatic cancer lies in our ability to limit surgery-related toxicity to those patients most likely to benefit from surgical intervention (i.e., to avoid laparotomy in patients with unresectable disease). Therein lies the importance of how the clinician defines resectability. The lack of a clear definition of resectability is largely responsible for patients seeking a second opinion regarding local tumor resectability following an initial unsuccessful attempt at tumor removal.

The article by Johnstone and Sindelar in this issue of the *Journal of Surgical Oncology* reports the NCI's experience with reoperative pancreatectomy. The magnitude of the operation involved in reoperative pancreatic surgery combined with the modest median survivals achieved emphasizes the need for a more precise definition of resectability based upon accurate preoperative imaging studies. Traditional means of intraoperative assessment of tumor resectability by palpation at the time of Kocher maneuver and establishment of a tumor-free plane between the superior mesenteric-

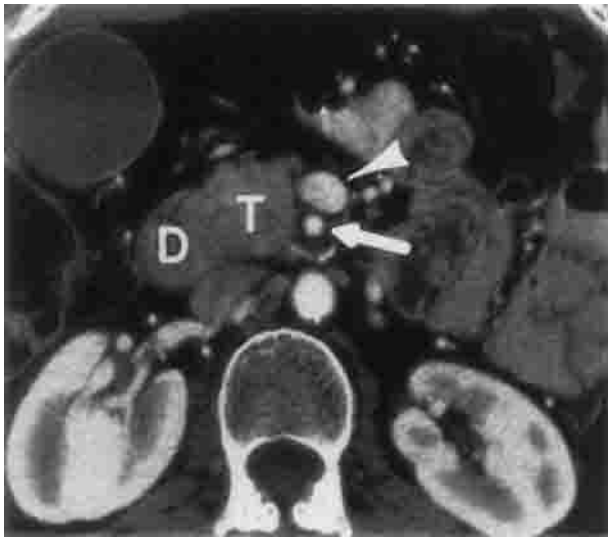

Fig. 1. Contrast-enhanced CT scan demonstrating a resectable adenocarcinoma of the pancreatic head. Note the normal fat plane between the tumor (T) and both the superior mesenteric artery (arrow) and the superior mesenteric vein (arrowhead). D, duodenum.

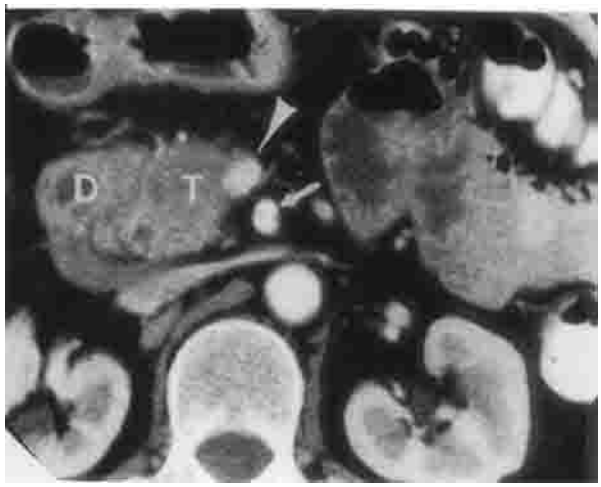

Fig. 2. Contrast-enhanced CT scan demonstrating a resectable adenocarcinoma of the pancreatic head as evidenced by the normal fat plane between the tumor (T) and the superior mesenteric artery (arrow). However, loss of the normal fat plane between the tumor and the superior mesenteric vein (arrowhead) should alert the surgeon, preoperatively, of the probable need for resection and reconstruction of the superior mesenteric-portal vein confluence. D, duodenum.

portal vein confluence and the pancreatic neck are now outdated. High-quality images obtained by computed tomography (CT) and endoscopic retrograde cholangiopancreatography (ERCP) enable accurate assessment of vital tumor-vessel relationships, allowing careful preoperative planning and decisive and expeditious surgical treatment. Exploratory laparotomy should be replaced by a clearly defined operative strategy for each patient subset based on precise anatomic definitions of resectability as defined below:

1. CT scan demonstrates no mass, yet ERCP identifies a malignant-appearing stricture in the intrapancreatic portion of the common bile duct. Since benign tumors are extremely uncommon in this region, adenocarcinoma of the pancreatic head, distal common bile duct, or ampulla of Vater should be assumed. Standard treatment is pancreaticoduodenectomy. There is no role for intraoperative tumor biopsy in this patient subset. A negative biopsy should be interpreted as a geographic miss by the biopsy needle; the working diagnosis remains unchanged. Patients should be counseled preoperatively that the potential for the pathologist to find no tumor in the pancreaticoduodenectomy specimen is real but less than 5%.
2. CT scan demonstrates a mass in the head of the pancreas with a normal fat plane between the tumor and the superior mesenteric vein and artery (Fig. 1.). A patient with these CT findings has a potentially resectable tumor and should undergo pancreaticoduodenectomy as part of a combined-modality program that includes either pre or postoperative chemoradiation. Biopsy prior to resection (under CT guidance) should be performed only in centers utilizing a strategy of preoperative chemoradiation. Again, there is no role for intraoperative biopsy of the pancreas.
3. CT scan demonstrates a low-density tumor mass in the pancreatic head that is inseparable from the lateral wall of the superior mesenteric vein, yet a tumor-free plane exists between the tumor and the superior mesenteric artery (Fig. 2.). Pancreaticoduodenectomy should be considered in this patient subset only as part of a multimodality treatment program and only by surgeons who have developed a strategy for venous resection at the time of pancreaticoduodenectomy. The most common site of venous involvement by a pancreatic head cancer is the lateral or posterolateral wall of the superior mesenteric-portal vein confluence. The plane between the anterior surface of this venous confluence and the pancreatic neck is often easily established. Therefore, venous invasion is found only after gastric and pancreatic transection, a point in the operation when nonresectional procedures are no longer an option.
4. CT scan demonstrates a low-density tumor involving both the superior mesenteric vein and the superior mesenteric artery (Fig. 3.). Pancreaticoduodenectomy should not be considered in patients with these preoperative CT findings. Tumor invasion of arterial structures usually includes extensive involvement of the mesenteric neural plexus, making radical resections not only technically difficult but also oncologically unsound because of the frequent finding of margin positivity. Multiple investigators have demonstrated

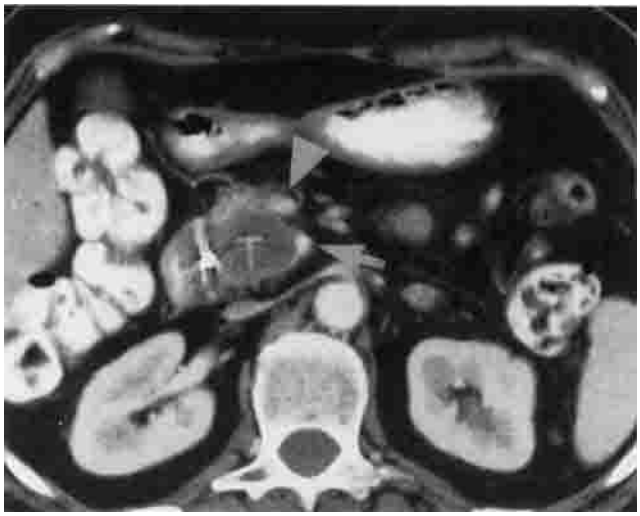

Fig. 3. Contrast-enhanced CT scan demonstrating a locally advanced, unresectable adenocarcinoma of the pancreatic head. Note the loss of the normal fat plane between the tumor (T) and both the superior mesenteric vein (arrowhead) and superior mesenteric artery (arrow).

that grossly positive margins of resection are associated with short patient survival—a survival no different from that of patients treated with chemoradiation alone.

Surgeons caring for patients with presumed or biopsy-proven localized adenocarcinoma of the pancreatic head should attempt to prevent the need for reoperative pancreaticoduodenectomy through the use of high-quality preoperative imaging studies to carefully assess local tumor resectability followed by an organized technical approach to tumor resection. This will not only maximize survival in patients in whom negative-margin resection is possible but, even more importantly, avoid operation in patients with locally advanced disease, who will achieve no specific anticancer benefit from laparotomy alone. "Exploratory" laparotomy should be eliminated from the vocabulary of the pancreatic surgeon.

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